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ABSTRACT

This manual was written for both environmental educators who want to evaluate the environmental education (EE) instructional materials they use or recommend to teachers, and inservice providers who want to help teachers evaluate EE materials in workshop settings. This information is provided to expand knowledge and expertise, facilitating informal yet thorough evaluations, and to help educators instruct others to do the same. The user is guided through an evaluation process and provided with tips, suggestions, criteria, worksheets, and workshop activities. Sections cover evaluation basics, evaluation criteria, developing an evaluation strategy, formal evaluation projects, workshop activities, and activity masters. A resources section contains a brief glossary of evaluation terms and 20 references to evaluated EE materials, evaluation tools, and additional readings. The manual is not intended to direct the development of formal evaluation projects that require statistically significant results. It is a practical guide, one designed to help users simply but effectively examine EE instructional materials to determine whether they meet their needs. (LZ)

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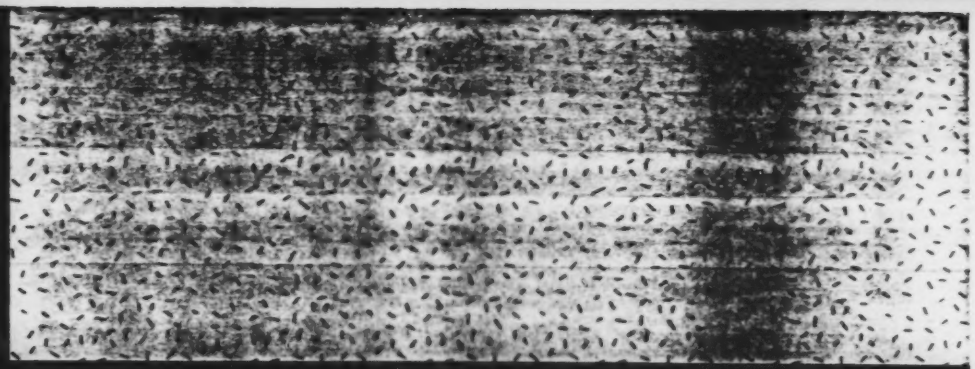

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Evaluating Environmental Education Materials

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Toolbox

EE Toolbox—
Workshop Resource Manual

Evaluating Environmental Education Materials

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This unit is written for both environmental educators who want to evaluate the environmental education instructional materials they use or recommend to teachers, and inservice providers who want to help teachers evaluate EE materials in workshop settings. This information will expand their knowledge and expertise, facilitating informal yet thorough evaluations, and help them instruct others to do the same. It introduces important background information, then guides readers through an evaluation process, providing tips, suggestions, criteria, worksheets, and workshop activities. We intend to help the following EE professionals:

Teacher educators can informally evaluate the materials they provide or recommend to teachers. They are also in an excellent position to help teachers learn about the evaluation process. In the workshop ideas and activities sections, teacher educators will find ways to introduce the central concepts of evaluation.

Nonformal environmental educators will find strategies to help them predict how well a given set of environmental education instructional materials meets their needs.

Curriculum specialists can use this unit to develop a systematic approach for reviewing EE instructional materials in their district. This approach helps ensure that materials are effective and meet state, local, or other specific educational objectives.

This manual is not intended to direct the development of formal evaluation projects that measure statistically significant results. It is a practical guide, one designed to help users simply but effectively examine EE instructional materials to determine whether they meet their needs.

Steve and Anita Take Stock

"I was nervous as we planned this workshop but the teachers really seemed to learn a lot!" exclaimed Steve, a resource specialist. He and Anita, a district environmental education coordinator, were meeting to discuss their recent biodiversity workshop.

"They seemed to have a good time too, but let's see how they evaluated us," Anita proposed as she began looking through the surveys teachers filled out at the end of the workshop. Anita pointed to a few of the completed evaluations, noting, "Several teachers did say they were overwhelmed with the volume of materials."

Looking over her shoulder at the evaluation forms, Steve said, "I wonder if we might be wasting some trees. Can teachers really use all those materials? Some of them took so much stuff, they had to make two trips to their car!"

"I remember when I was a teacher," Anita recalled. "Most of the resources I got at workshops turned out to be dust collectors. I just didn't have time to sort through all that stuff to figure out which were worth using. I still have that problem!"

She and Steve decided it would be better to provide teachers with only the best resources. They agreed it made sense to evaluate the resources they provide, just as they always evaluate the success of their workshops.

"It seems like a big task," said Steve. "I've read some articles in the *Journal of Environmental Education* (JEE), and all of them stressed being very systematic about evaluations, developing a rating scale, and setting up a committee of teachers. It seems like we should get someone at the university to do it."

"I don't think we need to be that technical about it for our own personal use," replied Anita. "I'm sure we can combine our knowledge of biodiversity and education with some of the information from those JEE articles and come up with an evaluation strategy that works for us and our workshop participants."

"I don't know, Anita. Do you think we'll be able to predict teachers' needs?" Steve asked.

Anita thought for a moment. "I have an idea," she said. "What if we build some time into our workshop for teachers to learn about a couple of evaluation scales. Then, using those scales as examples, they can select or create their own criteria, scales, and evaluation methods."

"Great idea!" Steve added. "We can figure it out and then pass those skills on to teachers and they can improve on our work. That way they can apply evaluation to all their EE materials." Anita and Steve agreed to do some research on their own. They planned to meet again to evaluate their materials and begin developing a workshop session on evaluation.

Introduction

ONE OF THE REASONS TEACHERS ATTEND INSERVICE PROGRAMS is to find new instructional resources. As inservice providers, we respond to this need by distributing instructional materials and handouts. Walk into any environmental education (EE) teacher workshop and you will see the walls covered with posters and tables piled high with supplemental resources containing content background, activities, and new teaching tips. EE conferences have rooms full of exhibits displaying new activity guides and other instructional materials.

Often teachers have no trouble finding EE materials, rather for many it is a daunting task to choose from all that are available. Teachers often have neither the time nor the confidence to sort through and choose the best instructional materials for incorporating EE into their curriculum. You can help teachers increase the quality of their lessons by providing simple and effective ways to evaluate EE instructional materials. Furthermore, evaluation can familiarize teachers with environmental education concepts. Teachers can make better choices to meet any number of objectives and individual needs, such as:

- meet state and local learning objectives
- address environmental education goals
- convey accurate information
- include relevant context for various socio-economic groups
- relate age-appropriate concepts
- adapt to different teaching styles
- accommodate the different learning styles of their students
- select interesting and easy-to-use materials
- fit individual constraints, such as time or money.

All educators can gain the skills and knowledge to evaluate environmental education materials. We will provide you with background information, simple tools, relevant examples, and activities. You can use these to evaluate the materials you present in workshops and to lead activities that build teachers' evaluation skills.

This unit focuses on evaluation of written environmental education instructional material, most specifically activity guides. However, the criteria and techniques discussed here can be adapted for use with many types of instructional material such as video, software, and texts.

The sections in this unit focus on the following steps:

Evaluation Basics
Background information puts the evaluation process in a larger context, helping you to better understand evaluation procedures, guidelines, and criteria. Included in Section 1 are basic terminology and key concepts. A more complete glossary of terms is provided on page 44.

Evaluation Criteria
The heart of any evaluation effort is the criteria used to rate the instructional materials. There is no single answer to what makes a good activity guide. However, there are several aspects that every EE activity guide should include. Section 2 provides a framework for developing criteria and suggests specific criteria relevant to EE. Use this information to generate a list of criteria that meets your specific needs.

Developing Your Evaluation Strategy
Just as no single set of criteria will meet all evaluation needs, no one evaluation strategy applies to all EE activity guides. Selecting a strategy can be a confusing task. This section (pages 11-15) demystifies evaluation strategies by providing both guidelines for modifying existing tools and step-by-step procedures for developing your own.

A Look at Formal Evaluation Projects
Just because an activity guide has been formally evaluated and approved by a particular organization does not guarantee it will satisfy your needs. The guidelines and real-life examples in Section 4 can help you evaluate methodologies. You can also use this section to understand some of your options if you are interested in developing a more formal evaluation project.

Most instructional materials may be useful even if they do not rate well on all criteria. It is best to focus on strengths, weaknesses, and usefulness in your evaluations.

What To Do in a Workshop
Teachers are more likely to evaluate materials if they receive hands-on experience in your workshops. Section 5 provides ideas, tips, and sample agendas to help you incorporate evaluation topics into your workshops. Several strategies are provided to help you choose an approach that will work best in your workshops.

Workshop Activities and Sample Tools
Section 6 complements the previous section by matching the workshop ideas with specific activities. Each activity is designed so you can use or modify it for your particular workshop.

Resources
This document may leave you wanting more information, ideas, and details. The Resource Section provides a bibliography of evaluation projects and additional readings.

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I

Evaluation Basics

LIKE ANY OTHER DISCIPLINE, evaluation has unique terms and concepts. This section presents some of the basic tenets of evaluation and environmental education. Understanding this background will help prepare you to adapt evaluation criteria and methods (described in sections II and III) without compromising effectiveness.

A Few Terms

Terms such as "curriculum," "instructional material," and "activity guide" are often used interchangeably. Perhaps they have very specific meanings for educators in your area. To avoid confusion in this document, we use these terms very specifically.

A curriculum is a complete course of study carried out over the semester or entire school year to meet a specific set of learning objectives. The learning objectives may be established by teachers, school districts, state guidelines, or national standards.

Instructional materials are resources that teachers use to address the curriculum. Such resources may include texts, activity guides, videos, and other materials designed specifically for classroom use, as well as newspaper articles, movies, comic books, and other sources of information on environmental concepts or issues.

Activity guides are one type of written instructional material that often contain background information, student activities, and suggested lesson plans. Many activity guides cover specific learning objectives and are designed as supplements, form a unit, or make up a course.

Evaluation of instructional materials is the systematic application of criteria to judge whether the materials will meet the user's goals.

These distinctions are intended to make one point very clear: most instructional materials should not be evaluated as if they will make up an entire curriculum. As part of a larger picture, they may be useful even if they do not rate well on all criteria. Hence, this unit focuses on identifying the strengths, weakness, and usefulness of written EE instructional materials for the specific needs of teachers.

Another set of terms is used to describe methodology. To help you meet your goals of developing a simple and effective strategy, the following sections outline an informal approach with the following characteristics:

Armchair Review: Emphasis is on an indirect evaluation of materials (before you use them) to select those that best meet your needs.

Teacher usefulness: These strategies include criteria based on goals of EE and how well the materials meet specific needs of teachers (vs. the goals of the authors).

Limited scope: The criteria and strategies in this unit are best suited to evaluate EE activity guides. Some criteria may not be appropriate if you are evaluating other types of instructional resources.

Single or Comparative: Criteria can be applied to one activity guide or used to compare several guides.

A Few Key Concepts

You may have an intuitive sense of what works, or know which type of activities are usually popular with students. Yet, if asked to provide an "evaluation," you may not know how to support your intuition. Is it enough to know whether activities excite students? Is helping them learn one or two concepts sufficient? You may find it difficult to define all of the factors that make an activity work with students.

One way to evaluate EE activity guides is to think about your goals as a teacher educator. Your role is to motivate teachers and help them develop a good knowledge base, skills, and a desire to bring EE to their classrooms. In measuring the success of your workshop, you may gauge whether they became more motivated, knowledgeable, skilled, and active environmental educators. Likewise, evaluating EE activity guides considers many of the same types of elements: reactions, learning, behavior, and results.[1]

Reaction Evaluation measures the users' immediate positive or negative response to the learning experience. This is the most common level of evaluation. An armchair review may predict how students will respond to the material.

Knowledge Evaluation measures whether using the activities with students increases their knowledge and awareness of environmental issues and influences attitudes. In an armchair evaluation you can assess the quality of the content and if teaching methods meet your students needs.

Behavior Evaluation measures whether the learning experience alters student behaviors. Your armchair review could determine whether the materials provide the knowledge and skills the learners need to be able to engage in new behaviors.

Results Evaluation measures whether the behavioral changes have an overall impact on the environment or students' lives.

It is very hard to measure whether an impact on students' lives is due to the instructional materials or any of a million other potential factors. In fact, evaluating for results is outside the scope of most informal evaluations and will not be discussed in this unit. Let's explore how you may achieve reaction, knowledge, and behavior evaluation in an armchair setting.

Comparing Direct vs. Indirect Evaluation

A direct evaluation of EE activity guides is easy to envision. Teachers can gauge student response and use a variety of assessment tools to find out whether students learned. In the context of an informal armchair review, you can only gauge *your* responses to the material. However, you can still add depth to your evaluations by focusing on the *likelihood* that the activity guide will elicit a positive response, help students learn, and change behaviors.

Direct evaluation usually yields a stronger certainty, but it is difficult to evaluate more than a few activities. With an indirect review you can critique many activity guides in one sitting. The two scenarios in the box on the next page illustrate how you might indirectly predict which guides will be useful.

Examples of Direct Evaluation and Indirect Review

Layton and Miguel have each received a new activity guide on recycling. Layton, a high school teacher, decides to evaluate it by using it with his class. Miguel, a resource specialist with a local governmental agency, does an armchair evaluation before using it in his next workshop.

Layton's Direct Evaluation

Reaction: Layton noted students' general level of enthusiasm, attention span, how many questions students asked and how hard it was to encourage discussion.

Knowledge: Layton started his class session by having students write a short essay about the impact of solid waste in their lives. He compared the level of knowledge in the essays to test scores from a post-lesson quiz.

Behavior: Students asked permission to set up a classroom recycling project. Layton noted whether the unit provided them with the motivation and skills to accomplish this task.

Miguel's Indirect Evaluation

Reaction: Miguel listed the attributes of fun learning experiences. He reviewed the activity guide for such factors as providing a variety of learning situations, relevancy to students in his area, and hands-on activities.

Knowledge: Miguel reviewed the activity guide to determine if key concepts were present, how well they were addressed from a variety of perspectives, and whether problems and solutions were presented so students may identify appropriate roles for themselves.

Behavior: Miguel looked to see whether activities presented information on a broad range of feasible action strategies and included activities directed at building skills students would need to engage in such actions.

Evaluation Criteria

II

CRITERIA ARE THE HEART of any evaluation effort. Now that you have a sense of what an armchair evaluation is, it's time to start defining the specifics. The number and type of criteria you use and the methods used to apply them will all effect your results. These specifics make each evaluation effort unique.

There are different categories of criteria you may consider for your evaluation. Educators tend to focus on the quality and accuracy of content. Learning styles and presentation of the material are also important considerations. Many EE evaluation efforts measure against the goals of environmental education Often teachers use state or local education objectives to define the content goals. This section provides a framework for developing criteria based on three overlapping aspects: environmental education goals, pedagogy, and materials design. Together, they can create a well-rounded, thoughtful evaluation. After you identify relevant criteria, Section III will help you place them in a usable format.

As you read this section, remember that the focus is on EE activity guides; there will be categories or specific criteria that do not apply to other types of instructional materials. For example, you would not judge a text on classification of trees against criteria for involving students in action strategies.

Environmental Education Goals and Objectives

The ultimate goal of environmental education is to establish an environmentally literate and involved citizenry.[2] To meet this goal, it is important that students not only learn environmental concepts but also be able to define environmental issues within a social context, understand multiple perspectives on an issue, and understand their roles in both environmental problems and solutions. (For a more in-depth discussion on the definition and goals of EE, refer to "Defining Environmental Education" in the *Workshop Resource Manual.)*

Objectives of Environmental Education

Awareness

Knowledge

Attitudes

Skills

Participation

from the Tbilisi Declaration, Unesco Conference, 1977[1]

Environmental Awareness and Knowledge
Two important factors that you can assess in an armchair review are accuracy and breadth of content. Teachers not familiar with an environmental topic area may need help in developing content specific criteria. You can start by narrowing the topic into 5 - 10 key concepts and develop criteria that address these concepts. You may wish to team up with environmental specialists for this step. Some important criteria might be:

- terms are defined
- environmental concepts are set in a social as well as an ecological context
- ecosystems include individuals, the local community, and the global community
- environmental issues relate to specific environmental concepts
- information contains multiple perspectives (or bias is declared)
- concepts are relevant to learners' life
- depth of information is relevant for the intended developmental level.

Attitudes
There's no way around it, environmental issues and the solutions we choose are value-laden. Attitudes about the environment are based on individual and social value systems. It is important for an EE activity guide to help students define and understand their own values as well as understand and value other people's perspectives. Students ideally come away from a lesson feeling positive about participating in environmental issues. Considerations of attitudes include:

- activities encourage a sense of personal stake and responsibility
- materials express a hopeful outlook
- materials contain positive role models for discussion and action
- activities encourage students to clarify their own values
- environmental topics are covered from a variety of perspectives, and no one perspective is predominant.

Skills and Participation
Students are more likely to become active in environmental solutions if they are aware of the range of possible actions, are able to evaluate them for appropriateness, and have the skills necessary to implement chosen action strategies. Successful EE instructional materials address action strategies in several ways:

- environmental problems are presented with a range of possible solutions
- the material compels students to consider the implications of possible solutions
- activities help students gain new problem solving skills
- action strategies focus on win-win solutions, whenever possible
- activities provide students with critical reasoning and problem solving experience
- both individual and community action strategies are presented
- activities help students gain communication skills, group skills, leadership skills, and other interpersonal skills necessary to become involved in solutions.

Pedagogy

Pedagogy, or how the material is taught, is an important consideration. Good environmental education is often said to be good education in that it emphasizes interdisciplinary, experiential, relevant learning and focuses on preparing students to participate in their community. Because environmental education is as much a process as a content area, many pedagogical criteria overlap with the environmental education criteria.

- a variety of cultural perspectives is included
- content excludes gender, race, age, and other biases (for more information on bias, see page 9)
- different learning styles are included (for example, hands-on, student-centered, research, lecture, and other methods)

- activities allow students to build from previous knowledge
- materials offer students the opportunity to practice critical thinking processes (such as hypothesis making, collecting and organizing data, analyzing, drawing conclusions, and problem solving)
- activities facilitate and encourage cooperative learning strategies
- teaching methods are appropriate to the guide's goals
- content pertains to state or local learning objectives
- materials can be readily integrated into established curricula
- appropriate student assessment methods are included
- learning opportunities are conducted in a variety of settings
- lessons include suggestions for extending or adapting the learning experience
- the materials can be easily adapted to varied learning environments, such as large and small classes, mixed-level classes, or rural and urban settings.

Presentation and Design

If a guide has illegible type, few graphics, a binding that disintegrates, or an exorbitant price, teachers may never discover that the content is good. Evaluating effectiveness of material design takes into account such elements as text and illustration quality, and the guide's organization.

- the goals and objectives of the materials are clearly stated
- teacher instructions are clear
- guide is easy to use and understand
- handouts and other masters are included and are easy to duplicate
- the writing is clear and interesting
- illustrations are appropriate and engaging
- required activity materials are supplied or easily obtained.

A Bit About Bias

Teachers should address the issue of bias when evaluating resources. Each of us has our own biases developed through our experiences. In addition to our personal biases, we are confronted with many forms of bias every day—in textbooks, posters, newspapers, and on television. Industry and environmental groups are most often accused of presenting slanted information, but almost all forms of informational media contain some type of bias. Many are very subtle and merely a matter of how "facts" are determined and presented. Who pays for the material often indicates what slant it might take. For example, textbooks tend to include the same material, edition after edition, because that is what teachers and curriculum committees expect and therefore will buy. The bias is toward status quo and tradition, determined by sales. Other forms are more obvious, such as language that portrays leaders, scientists, or active individuals as men, or illustrations of domestic roles portrayed by women.

Freshkills, Staten Island is the world's largest landfill. It serves 7.5 million people and won't be filled for another 10 years. Thirty-five similar landfills could serve the whole United States and occupy 0.005% of the land in the lower 48 states. It would take more than 7,000 centuries for the United States to be buried in its own solid waste.

— NYC Department of Sanitation

Although this is factual, one can detect bias. Where 35 enormous landfills will be placed, the cost of trucking waste from one state to another, and the wisdom of burying resources at current rates aren't mentioned.

It is important, therefore, for educators to acknowledge that we do not live in a world free of bias and to facilitate students' ability to recognize and address bias in their lives.

Recognizing bias is the first step to approaching issues (especially value-laden environmental issues) with an open perspective. We each have our own bias; comparing different materials will help identify it. Activity 5: "What About Bias" (page 43) is designed to help teachers see bias in instructional materials and discuss how to overcome it.

Some types of bias relate to:

- race
- culture
- age
- gender
- political views
- economic status
- different stances (e.g. industrialist vs. environmentalist).

Identification of bias is a critical step in evaluating materials. You may not want to eliminate all biased material. Such material can help students understand what bias is, that they are affected by bias, and that they would, therefore, gain from identifying their own biases. Educators can deal with bias in a variety of ways:

- not use the material
- accept the bias as is
- balance the bias with other materials
- point out the bias to students and have them discuss and analyze it
- help students develop critical thinking skills to identify bias on their own
- modify materials to reduce bias.

Developing Your Evaluation Strategy

III

HOW DO YOU BEGIN to deal with all these criteria and how do you keep track of them when you are reviewing activity guides? In developing your strategy you will prioritize criteria, choose questions that address these criteria, devise a way to apply the criteria that is meaningful, and keep track of your impressions so that you can compare several activity guides.

Teachers will benefit most from a streamlined evaluation process and simple tools. This section, along with the evaluation tools included in Section VI, will allow you to develop an evaluation strategy that meets your own and teachers' needs. Section V provides several ideas for helping teachers personalize this evaluation strategy in a workshop setting.

For ease of understanding we have presented the evaluation process as four steps: Step 1, Quick Review of Materials (p. 11), Step 2, Prepare Your Evaluation Tool (p. 12), Step 3, Compile Results (p. 14), and Step 4, Evaluate the Evaluation (p. 15). You will probably go back and forth between steps to assure your strategy meets your goals. Keep in mind that you don't have to reinvent the wheel. Use this section to help you modify existing tools to best suit your needs. (Three samples are provided in Masters 3, 4, and 5.)

Step 1
Quick Review of Materials

This first step is a fast way to get an initial impression of the materials you will be evaluating. You will most likely notice prevailing presentation styles, glaring biases or omissions, and age-appropriateness concerns. A quick review is not necessary but is useful in the following ways:

- To *categorize* materials into content areas, age levels, and other categories. One set of criteria may not be appropriate for all types of materials; you may wish to refine your criteria for each category.
- To *reduce* the number of materials included in your evaluation. Once you have categorized materials, you may want to eliminate some categories from your evaluation. For example, you may decide to evaluate only those materials relevant to middle school social studies or to water quality issues. Be careful not to discard items because they are not familiar or do not match your particular style and viewpoint.
- To *review* the material with an eye toward deciding how to apply criteria. For example, you may find that all of the materials fit basic EE goals but not in the same way. This would lead you to ask *how well* each of the goals are met.

You can use the questions that follow to make your initial cuts. Questions of this type can most often be answered with a simple "yes" or "no" and still provide good direction about whether to take a closer look at the material.

- Does the activity guide focus on a desired content area?
- Are activities age-appropriate?
- Are the activities appropriate for the learning setting (for example, outdoor center, classroom, factory visit)?
- Is the guide readily available to teachers in your area?

Picking Strategy

Sometime after they discussed developing an evaluation session for their next workshop, Anita and Steve gathered their teacher resource materials.

"No wonder teachers don't use all the resources we give them. No one has enough time to go through all these materials!" Steve sighed as he pushed aside a stack of activity manuals. "I know some of these are great resources only because I've used them. We need to have some system that will help teachers make choices without having to test each one."

Anita glanced at Steve's stack of resources. "OK, it's obvious we don't need some of these materials for a biodiversity workshop. This one doesn't address biodiversity and here's another that only has activities for early elementary children. Let's weed out the ones that don't fit with the workshop."

Anita and Steve began sorting through the materials selecting only those that pertained to biodiversity. After a few moments Steve noted that he had found quite a few resources addressing biodiversity but one was a comic book, two were videos, several were activity guides, and some were simply informational pamphlets. Using the same criteria to evaluate such varied media would be difficult. They decided to narrow their search to activity manuals that dealt with biodiversity.

Step 2
Prepare Your Evaluation Tool

There are two ways to approach this step: use an existing evaluation tool or develop your own. While it may be more expedient to use an existing tool, you will want to modify it to meet your specific needs. Activity 3, (page 28) provides several sample tools. Use the ideas under approach A as a guide to modifying these tools for your use. Developing your own evaluation tool may seem like a daunting task. Approach B breaks this task down into substeps to make it more manageable. Remember, the shorter and simpler your tool, the easier it will be to use.

No matter which approach you take, remember that the easier the tool is to use, the more likely your results will be easy to understand. Here are some general rules of thumb when modifying or developing an evaluation tool:

- Format so that the page is easy to read; guidelines are easy to follow
- Make it easy to tally answers
- Have questions relate to one criterion
- Keep it short
- Do not use double negatives
- Do not ask two questions at once.

A. Modifying Existing Tools

Most evaluation tools were developed for evaluation projects that meet the needs of a large and varied audience. The criteria may be broad and the rating scheme complex. Before using them, consider adapting them to reflect the specific needs of the teachers in your area. If you are a bit uncertain about your teachers' concerns, you could meet with a few teachers or talk to a district curriculum coordinator. In a teacher workshop you may want to brainstorm what teachers need from EE materials (see Activity 1). To modify existing tools, you may cut, change, or add questions, and modify how questions are rated. Here are some guidelines on modifying both criteria and rating schemes.

Both went back to work. In a short time Steve and Anita reduced their stack to a more manageable size. Anita noted, "We could weed out a few more if we identified resources that deal with the appropriate age level. Let's select only those that are designed for grades 4-6 or grades 7-9."

"We could be even more specific and categorize them by learning setting, like outdoor, classroom, or nature center," Steve suggested.

This time Anita and Steve found their system was getting too complicated. Few of the resources met all the criteria. They decided upon the following criteria to make their initial cuts:

- activity manual
- contain activities on biodiversity
- designed for grades 4-6 or 7-9

When they finished sorting and piling, Steve felt a sense of accomplishment. "I think we've saved ourselves a lot of time. Now that we've reduced the numbers, we can devote more time to evaluating them," he said.

Anita pulled out a sheet of paper. "You're right! Let's figure out what kind of things we'll look for as we evaluate."

Narrow your scope: Balancing thoroughness and simplicity is crucial to success. Start by eliminating criteria that do not relate to your content concerns. Then prioritize the criteria and focus on what will help teachers incorporate EE into their lessons.

Adding Questions: You may find that you wish to add questions that apply to local education mandates or goals. When adding questions, frame them similarly to existing questions so you may use the same ranking process. To make tallying responses easier, keep the ideal solution positive. Similarly, on a rating scale of one to five, always make five the best or the worst.

Changing Criteria: Rather than eliminate a criterion, consider modifying the way it is applied to make it more relevant. There are several ways to ask a question about the same criteria. For example, you could change a general question about learning styles, "Are many types of learning situations used?" to fit a specific learning style need: "How many lessons incorporate student-directed learning?" You may wish to refine the questions to better relate to the materials you are evaluating or teachers needs. Use the same guidelines as above to write good questions.

Modifying the rating system: Many tools are designed to give statistically reliable data. Therefore, the rating procedure may be more complex than you need. You may not even need a rating system unless you wish to compare among several activity guides. Instead you could make notes about the strengths and weaknesses.

B. Creating Your Own Tool

To develop your own evaluation tool, you must first create a survey instrument out of the criteria you have chosen. Then you figure out how the answers to those questions will help you compare activity guides. These two concepts go hand in hand.

Converting Criteria: The criteria sets in Section II will help you think about the criteria that are important to you. To turn a generic criterion into an evaluation question, think about what you really want to know and how teachers will use the information. Questions can be asked to give yes/no answers, to help choose a number on an answer scale, or to give a narrative response. For example, the criterion, "Activities encourage students to clarify their own values" may be converted into several questions: "Do activities guide students in identifying value positions held by themselves and others?" "To what extent do activities allow students to form an opinion?" or "To what extent are students encouraged to defend or challenge their opinions?" Framing the criteria will take some practice and you may wish to do so in conjunction with the next step.

Developing a Rating System: The questions must help you evaluate the materials. What will each answer mean? You can use anything from a simple checklist to a complicated ranking procedure. The following common methods may be appropriate for your use:

- Check off which criteria are met. This works best with yes/no questions.
- Each activity can be assigned a score and the scores averaged or added together to give each guide a total score.
- If some questions are more important than others, think about weighting some questions in a summary score.
- Use a narrative response style for the criteria. This will provide more information, but it is difficult when used to compare many activity guides. One way to present information is to group similar responses together or to develop a short annotation for each activity guide. If more than one person is evaluating, you can indicate how often similar responses were given.
- The most common type of tool provides a range of responses for each criteria. In this method, criteria measure *how well* the guide meets each criteria, rather than a yes/no type of response. For example, "On a scale of 1-5, where 1 = not at all and 5 = very well, how well does the activity guide incorporate different learning styles?"

Most new evaluation tools will have a few kinks to be worked out. We recommend that you pilot test your tool on at least two activity guides. See if each criterion can be addressed the way it is asked. If not, try to phrase it differently. Also, make sure the information generated by each criterion is useful in determining whether the activity guide meets your goals and those of EE.

Step 3
Compile Results

If you are evaluating materials simply for your own use, you may not need to compile the results into a publication or report. You could simply keep the rating sheet with the activity guide or jot down notes on the strengths and weaknesses. If you do wish to compile the results for others there are several approaches:

- List only the materials that have met a minimum number of criteria. Include a list of the criteria so that teachers can determine whether the materials have been rated on items that meet their needs.
- Present the ratings in a matrix that show how each guide met the criteria. This allows teachers to select materials that rate high on criteria that are important for them.
- Write an annotation for each guide that shares the strengths and weaknesses. If you compile results for others, be sure to explain your evaluation methods and criteria.

Table 1: Sample Format for Compiling Results

Water, Precious Water **Overall Score = 4**
This collection of lesson plans is a well-organized series of laboratory hands-on activities.

Report Card

Teaching and Learning .....A- Grades K - 6

Presentation and Organization .....A Disciplines:Math, Science

Water Content. .....B+

Teaching and Learning: The labs emphasize the scientific process of investigation and offer many opportunities for inquiry. Suggestions for extended activities are included. Most teachers will want to choose from the wide variety.

Presentation and Organization: The directions to teachers are clearly written and contain well-defined objectives. The work pages are well-illustrated, uncluttered, and easily duplicated. The book's binding is a little weak. No bibliography.

Water Content: The broad range of topics cover water awareness, the water cycle, water quality, water conservation, treatment and distribution, and the properties of water. However, there is nothing on water resource problems in California.

Teacher's Thoughts: Students and teachers both will enjoy working through these lessons which emphasize the quantitative nature of science.

Adapted from *Compendium for Water Resources*, California Department of Education[4]

Step 4
Evaluate the Evaluation

Think of your evaluation technique as an evolving process. The more you reflect on the results, the more you will increase your skills and produce better results. To evaluate your evaluation, make sure that you have met the needs of teachers who are selecting EE activity guides. Indirect evaluation can not, however, guarantee that the materials will work with students. Whenever possible maintain records of teacher feedback on their experiences with the materials in the classroom. Comparing this information to your evaluation results will help you refine your criteria and methods the next time you evaluate materials.

Guidelines and Reminders:

Aim to identify strengths and weaknesses of the materials.

Establish a systematic procedure, follow, and document it.

Include a *Not Applicable* option in your questions.

Pilot test your tool.

Check with teachers about their reactions and advice.

Document your methods.

IV

A Look at Formal Evaluation Projects

IF YOU ARE USING someone else's evaluation results, you may wish to critique their findings. First, examine their work closely to make sure the evaluation is relevant to your situation. Find out how the data were gathered. If this information is not apparent or detailed enough, contact the authors.

This section gives an overview of three common evaluation methods, described in order of increasing complexity. Each is illustrated with a real application to help you critically review the evaluation results, understand the strengths and weaknesses of each approach, and use the results of each method appropriately. As you review these evaluation strategies, be sure to note the methods used, built-in assumptions, and the format used to report results. These and the factors listed below affect how applicable the results are to your specific needs:

Evaluators: Do evaluators have relevant experience? Were they familiar with the activity guide's specific content and EE in general? Do they have classroom experience? Do they represent the teachers who might use the evaluation results?

Criteria: Were they chosen to meet specific audience needs or general audience needs? Are criteria meaningful to you? Are criteria that are important to you given a high priority?

Results: Do the results provide enough information to allow you to make an informed decision? Do the recommendations take into account the context in which the guides will be used?

Be wary of many "evaluations" that include no critical analysis. They are usually reviews that list materials in categories, but without ratings. If you do an ERIC (Educational Resources Information Center) search for evaluations of EE instructional materials, you will find the majority are reviews and formative evaluation projects. Comparative, quantitative evaluations that rate EE activity guides are fairly rare.

The Expert Review

The Expert Review method uses one or more select people to conduct an armchair review of instructional materials. The expert is most often an impartial external evaluator who has experience with the criteria. The expert must have both environmental education and content expertise.

This approach offers several advantages. An external expert may provide an objective look at materials that are produced internally. An expert review can provide a comparative evaluation of many resources in a short amount of time. This approach also offers a relatively low cost alternative to developing staff expertise in EE and evaluation. When using the recommendations from this type of review look for:

Bias – The biggest disadvantage to the expert review model is the limited perspective one or a few persons can bring to the task. You run the risk of a heavily biased evaluation.

Qualifications of Experts – It may be difficult to find one person with both content and educational expertise. You may wish to research the qualifications of the experts if they are not listed.

Support for Recommendations – This method yields an educator's interpretation of what will be instructive for students. Actually using the materials may yield different results. You may wish to find first-hand knowledge of some of the materials to double check the recommendations of the expert.

The Pacific Gas and Electric Teacher's Resource Guide, Sacramento, California [5]

Pacific Gas and Electric (PG&E) recognized that the utility needed to evaluate the materials they disseminate to educators before ordering new materials and printing another catalog. Since they did not have an education specialist on staff, the company opted to conduct an evaluation by contracting with an EE specialist familiar with energy issues. The expert they contacted recently compiled a computerized collection of more than 300 energy education resources and had written an energy education activity packet for grades 4-6.[6] The expert spent three days evaluating the utility's library of materials based on criteria used in other evaluation projects. As a result of this effort, the expert recommended which materials should be rewritten, expunged, reordered, or added to the collection. Based on these recommendations PG&E rewrote its teachers' guide.

The Group Review

The Group Review is an expansion of the expert review. It uses a group of content experts, educators, and/or environmental educators. Their results can be tallied and statistically analyzed to say with qualified certainty that some materials are better suited to the chosen goals than others. Ideally, the evaluators represent a specific audience, provide expertise across the diversity of materials, and provide a geographical, cultural, and gender mix. This approach is also an indirect evaluation although some of the evaluators may have first-hand classroom experience with the materials. Things to 'ook for when reviewing this type of evaluation project include:

Evaluators – Do they represent the spectrum of teachers that come to your workshops? Does the mix of evaluators give the breadth of expertise that represents the range of materials evaluated?

Number of Evaluators – If there are not enough evaluators and responses don't agree, it will not be possible to interpret data with reliability. Resulting data could be misleading. The number of evaluators should be noted along with the degree of agreement between evaluators (often displayed as a standard deviation).

Methods – It is important that the evaluation tool was tested to assure that all evaluators were evaluating in a similar fashion, interpreting criteria the same, and that all evaluations were accurately recorded and compiled.

Results – Are the criteria reported with the results? How were the criteria determined?

Educating Young People About Water: A Guide to Goals and Resources

The United States Department of Agriculture Extension Service gathered a review team of water education specialists to evaluate water education materials. Sixteen people from state and private agencies combined their efforts to (among other goals) summarize information about water education materials. The project focused on nonformal education materials. The resulting guide was developed to help development of Cooperative Extension education programs and materials.

This **Water Quality Initiative Team** supplied copies of instructional materials and recommended other resources. They also helped identify water education goals and topics. It was determined that due to the volume of water education materials it would be expedient to develop a short-term, initial project. The objective was to review and classify a selection of available materials as a basis for understanding what was missing and needed.

An initial selection for materials to review was based on three criteria. Material was included in the review if it:

- addressed one or more of the study's general or specific goals
- presented a planned education experience
- improved representation of regional water concerns, varied water topics or environmental education goals.

The chosen materials were evaluated against eight water topic criteria, five EE goals criteria, and five format criteria. The intent was to see whether the water topics, EE goals, and preferred format were present. The results were compiled to show overall strengths and weaknesses in each instructional material. A summary of each material provided information that will help educators select materials. The final report presents information in four ways:

- an alphabetized listing of materials that provides a brief description of the material,
- a listing of availability by state or region,
- a listing of materials from national organizations or nationally available sources, and
- a matrix that shows review results.

The Pre-Test/Post-Test Review

Instructional materials sometimes fall short of expectations. Directly evaluating the impacts of the activities is the most accurate way to determine whether the materials meet the learning objectives. The pre/post approach is the only one described here that evaluates materials through direct interaction with students. This model dictates that students be given a test before they have a planned learning experience with the activities to be evaluated. After the lessons, students take a post-test, which is similar to the first test. Presumably an improved score means that the learning experience was a success. A control group completes the pre-test and post-test at the same time as the treatment group to assure that the instructional activity, and not another learning situation, was the source of the improved scores. Any increase in the control group's post-test score results from a factor other than the instruction; this increase should be considered when computing the treatment group's gain.

Teachers chosen to evaluate the activities are randomly assigned to treatment and control groups. Activities are randomly assigned to help increase accuracy of the evaluation results. The pre/post test method is not usually used to compare among activity guides: it is most often used to measure the effectiveness of a single set of activities.

When reviewing the results of this type of evaluation, be sure to consider the following:

Test Construction – In using a pre-test, you run the risk of alerting the students to the important concepts or simply raising their curiosity about the new material. The tests should be similar but not exact or students may improve due to practice.

Biases in Teaching – Teachers who are familiar with the activities could do a better job at teaching than ones that are not. Activities should be randomly assigned so teachers get a mix of familiar and new activities.

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Significance of Learning – Success is typically defined as a better post-test score, based on the activities that are conducted. This will not guarantee that all activities are equally successful, or that broad goals for the materials are met that are not addressed in these activities.

Project Learning Tree, Environmental Education Pre K-8 Activity Guide[5]

Pre/Post testing was the primary method used to do a summative evaluation of the 1994 Project Learning Tree (PLT) Activity Guide. PLT contracted with the North American Association for Environmental Education (NAAEE) to evaluate the effectiveness of the new activities. The project entailed several professionals and a budget of over $50,000.

Pre-tests were given in 120 classrooms in the grade-level groups of Pre K-1, 2-3, 4-6, and 7-8. (Pre K -1 students performed tasks and their teachers reported results on computerized answer sheets.) The tests were designed to measure students' knowledge and attitudes about one of several themes, including diversity, interrelationships, patterns, structure and scale, and systems. About two days after administering the pre-test, teachers in 60 classrooms used between three and seven randomly assigned activities that addressed one of the five strands. Within a week or two, students in all 120 classrooms took the same test again. All of the test data from a single classroom yielded a single score for that class. All the classes from the same grade level that experienced activities addressing the same PLT theme were averaged into one score. Teachers were also asked to keep a log, noting anything that seemed significant as the evaluation progressed. Logs are not always included in this evaluation model, but can provide some significant and helpful information. This qualitative information helps the researchers interpret results more accurately and can provide new insights into the usefulness of the materials.

V

What to Do in a Workshop

ONE OF THE BEST WAYS to build teachers' skill is to have them develop a survey tool and use it to evaluate some materials. If you do not have the luxury of a few extra hours, even a short overview on evaluation can be a valuable addition to any EE workshop. Below are three scenarios to help you plan your workshops. The activities are provided in Section VI.

Approach A
Provide Evaluated Materials and Criteria

Providing evaluated EE resources will reduce the effort teachers spend on selecting instructional materials. Although this method often requires more of your time and work before the workshop, it is one of the simplest workshop strategies. If you familiarize participants with the goals, criteria, and results of evaluations, they can use this information to review other instructional materials.

You can either use resources that have been evaluated or evaluate the ones you have. If you present materials that have been evaluated make sure the criteria, methods, and results are relevant to your teachers. Be sure to provide and discuss these elements. If you evaluate the materials, consider using one of the evaluation tools supplied in Activity 3, page 28. (Sections II and III can help you modify these tools.) When using this method to plan a workshop, consider the following tips:

- Before the workshop, identify some of the teachers' key needs for resources and the areas of EE they want to address. Use these needs to modify the evaluation tools.
- Reserve time in the workshop for teachers to describe and discuss the resources that have worked for them.
- Consider providing workshop participants with the actual evaluation tool that was used to evaluate the workshop materials. With the tool available, they can decide which criteria are most important to them.

Example Agenda

I. Distribute handout listing evaluated EE instructional materials

II. Overview of evaluation method
   - A. Criteria used to evaluate
   - B. Results of evaluation

III. Teachers share favorite materials

Approach B
Developing Criteria

The workshop strategy described in approach A puts you in the position of doing most of the work. Although this strategy saves time for teachers, empowering them with a hands-on evaluation experience may increase their commitment to evaluating other EE instructional materials. This approach builds teachers' interest in evaluation and helps them understand how to best choose criteria that meet their needs. You might consider the following suggestions:

- Build a rationale for evaluating EE materials. Using Activity 1 on page 24, help teachers think about why they would bother evaluating activity guides. Pair this activity with one of the two ideas below to give teachers the experience of developing their own evaluation criteria.
- Introduce the topic with a short over view of evaluation and the goals of EE. You can provide them with a short version of the information on pages 4 - 7. After this discussion, have teachers brainstorm and prioritize a list of criteria. You may augment this list with Master 2.

- Alternately, get teachers thinking about evaluating criteria by having them review an activity guide and ask them for their opinions. Help them see how their "gut reaction" can help generate criteria. Have teachers work in groups to develop criteria for EE goals, pedagogy, and presentation. You may refer them to Section II. Activity 2 details this strategy.

Example Agenda

I. Build a rationale (Activity 1)

II. Overview of evaluation concepts
   A. Levels of evaluation
   B. Indirect vs. Direct

III. Develop criteria (Activity 2)

IV. Teachers share their results

V. Teachers share their favorite materials; explain why they work

Approach C
Do a Mini Evaluation

One of the best ways to prepare teachers to evaluate potential resources is to have them evaluate an activity or a guide during a workshop. While this approach is time-consuming, it provides teachers with the skills and practice necessary to become proficient evaluators. Given teachers' schedules, this may be the only time they actually get to evaluate some of the materials you give them.

Building on the activities suggested in the approach above, take teachers to the next step. Activities 3 and 4 provide strategies for leading teachers through an evaluation process. As you develop the workshop, consider these ideas:

- Give participants an opportunity to develop their own criteria. You can streamline these strategies by having teachers review the EE guides while asking: How will students react to the activities? What will the activities help them learn? How will the activity guides affect student behaviors and participation in environmental issues?
- Divide into groups and have each group evaluate the same activity guide but with different tools. Discuss the strengths and weaknesses of the tools.

" One of the most precious gifts you can give to teachers is time to plan how to use the new information they acquire from an inservice workshop."

Margaret Pennock
Teacher, Mast Landing School, Freeport, Maine

You can use this feedback to modify the tools.

- Divide teachers into groups. Each group can evaluate a different guide with the best tool. Compile the results from group reports.
- Provide time for teachers to talk about which resources have worked well for them.

Example Agenda

I. Build a rationale for evaluation (Activity 1)

II. Brainstorm the goals of EE instructional materials

III. Develop criteria (Activity 2)

IV. Evaluate an activity or activity guide (Activity 3)

- A. Groups do same activity guide
- B. Groups do different activity guides

V. Compile results

VI. Discuss how to adapt tools

VII. Teachers share their favorite materials

Summary

There is no shortage of EE materials from which to choose. Only you can really determine which instructional materials best meet your needs and the needs of the teachers you serve. Helping you make those decisions accurately and quickly is a major goal of this unit. We have looked at some of the general principles of evaluation so you might create evaluation strategies that yield accurate and useful information. In this process we have discussed selecting criteria and how to best apply them to the materials you wish to evaluate. Interpreting your results and evaluating your process are the final steps of this procedure. We also hope you gained some skills to interpret the result of the more formal evaluation efforts you will encounter.

If you find this systematic evaluation process valuable, you will want to share it with the teachers with whom you work. The background information, the workshop guidelines, and the activities provided will help you encourage teachers to critically evaluate the instructional materials they have and will encounter in the future. Ideally, we will all become informed consumers and disseminators of high-quality EE instructional materials.

Activities and Masters

VI

THESE WORKSHOP ACTIVITIES AND SAMPLE TOOLS will help you design a short segment or develop an entire workshop that focuses on evaluating EE materials. Using Section V as a guide, you can build these activities into a module that fits your participants' needs.

Activities

The first two activities help develop an overview of the topic of evaluation by defining the goals of evaluating materials and what it means to evaluate.

1 Building a Rationale

This activity helps participants justify an armchair review of EE materials. Teachers discuss benefits and goals for evaluating instructional materials.

2 What is Evaluation?

To introduce teachers to the concept of evaluation, this activity asks teachers to develop a framework for evaluating EE activity guides. The overview of EE goals and evaluation criteria categories will help teachers use evaluation tools and results of evaluation efforts effectively. Two masters for overheads are included.

Immersing teachers in an evaluation project will help them gain both a better understanding of the process of evaluation and confidence in their ability to effectively evaluate new materials. Activities 3, 4, and 5 will also leave teachers with a set of strategies and tools that suit their particular needs.

3 Trying Out Some Tools

Using three sample questionnaires, participants critique and modify an instrument to help identify materials that meet their needs.

4 Learning to Look

Teachers will compare activities that contain similar content but different teaching methods. Participants will discuss aspects of pedagogy that will affect evaluations of these types of instructional materials.

5 What About Bias?

Teachers discuss the inevitability of bias, then practice discovering it in materials. Five strategies for dealing with bias are provided.

Activity 1

Building a Rationale

This activity helps participants justify an armchair review of EE materials. Teachers discuss benefits and their goals for evaluating instructional materials.

Objectives

To help teachers identify goals for their evaluation.

Materials

Markers, tape.

Time

30 minutes

Outline

Set the stage by asking teachers to imagine that they will be given a complete set of new resources for the school year. Although they are not familiar with these EE materials, they are all good teachers and know what works in the classroom. They will be using their expertise to evaluate these new materials, and to determine how to use them. But first, they should discuss what they will be looking for.

1

Divide participants into smaller groups of three to five. Ask them to appoint a facilitator, recorder, and timekeeper. Give each group a piece of newsprint and a few markers.

2

Give the groups 15 minutes to come up with a list of goals for EE instructional materials and record them on paper. You might find these questions help stimulate good discussion:

- What do you want teaching materials to accomplish?
- What do you look for in a piece of instructional material?
- What makes activities a success with students?
- What do you need from new materials to help you teach well?

3

Have each group post their report on the wall. Invite all participants to walk around the room viewing each others' goals.

4

Conclude by leading a large group discussion on the similarities and differences of each group's goals. Invite participants to think about the value of taking time to evaluate materials by asking them the following questions:

- What are the basic goals of evaluation?
- How can evaluation help you meet your teaching goals?
- How can you use this exercise to help you think about evaluation?

Activity 2

What is Evaluation?

To introduce teachers to the concept of evaluation, this activity asks teachers to develop a framework for evaluating EE activity guides. An overview of EE goals and evaluation criteria categories will help teachers use evaluation tools and the results of evaluation efforts more effectively.

Objectives

To introduce teachers to the concept of evaluation; to provide a framework for evaluating EE activity guides.

Materials

A set of activity guides for each group of three to four participants, newsprint, markers, and overhead Masters 1 and 2, if you wish.

Time

30 minutes

Outline

Divide participants into groups of three or four. You may group teachers randomly, or by grade level or content specialty. Explain to the teachers that they will evaluate activity guides.

1

Give each group copies of an activity guide. NOTE: If you wish to have teachers bring their favorite activity guides to evaluate, ask them to work in pairs, using one guide between them.

2

Give the groups 10 minutes to quickly review the guide. Have teachers independently list their impressions of the activity guide, both good and bad. Teachers then share their impressions with their group or partner. Each group should record their reactions to the material.

3

Have each group report their results. Record their comments on a newsprint or overhead. Lead a discussion using the following questions:

- How were their results different? Why?
- On what grounds do they base their reaction to the material?
- If they had more time, what else would they consider?

Using overhead Master 1 and the background on pages 4 - 5, explain the levels of evaluation. Identify which of their reactions relate to each level.

4

Using background from pages 7 - 9 and overhead Master 2, provide an overview the three categories of criteria: EE goals, Pedagogy, and Presentation and Design. Discuss what criteria the groups used. You can stimulate the discussion by asking:

- What questions did you ask yourself?
- On which aspects of the material did you focus?

5

Have each group put their evaluation criteria into the categories. Have them discuss any gaps they see and develop additional criteria to fill these gaps. Have them review the activity guide a second time to rate how it meets their new criteria set.

6

Conclude by asking teachers to discuss:

- How is evaluation different from judging on opinion alone?
- How can they apply this knowledge to looking at new EE materials in the future?

Master 1

Levels of Evaluation

Reaction Evaluation

measures immediate response

- to the learning experience (students)
- to the materials (teachers)

Learning Evaluation

looks for changes in:

- knowledge
- awareness of environmental issues
- attitudes

Behavior Evaluation

looks for changes in:

- students' skills
- student behaviors

Results Evaluation

measures impact on:

- the environment
- students' lives

Master 2

Criteria Categories

Goals of EE

- Awareness
- Knowledge
- Attitudes
- Skills
- Participation

Pedagogy

- Teaching and Learning
  - interdisciplinary
  - age appropriate
  - critical thinking
  - cooperative learning
  - assessment
- Bias
- Integration into Curriculum

Presentation and Design

- Format
- Writing
- Appearance
- Organization

Activity 3

Trying Out Some Tools

Using sample questionnaires, participants critique items and modify an instrument to help them identify materials that meet their needs.

Objectives

To help participants recognize the importance of how evaluation questions are worded and the length of evaluation tools. To give participants practice in using several evaluation tools. To have participants modify an instrument to meet their evaluation needs.

Materials

One activity guide for each group or copies of activities. Copies of each of the sample evaluation tools provided in Masters 3, 4, and 5.

Time

One to two hours with optional activities

Outline

Participants will practice using different evaluation tools to evaluate the same piece of instructional material. This will give them insight into how different criteria, questions, and rating strategies can affect the results. They will use this insight to adapt the tools for their use.

1

Distribute a copy of each sample tool and either one activity or a complete activity guide. Ask each team to evaluate their material with each of the three tools. Have them discuss among themselves which tool they liked best and why.

2

When teams finish their reviews, lead a discussion with the following questions:

- Did the evaluations result in equivalent information?
- If not, how did they vary?
- On which criteria are the answers most varied? Why?
- What questions did they have about using the tools?
- Which tool did they like best and why?

3

(optional)

Have each group list the characteristics of the tools they liked best. Ask them to consider the types of questions, rating strategy, ease of use and how it related to their teaching needs. Using these qualities, have the group modify one of the tools or develop a new one based on their needs.

4

(optional)

Have each group share their new tool, presenting the characteristics, types of questions, and comparison strategy to the whole group. If possible, make copies of each new tool for all groups.

Master 3

The EE Curriculum Inventory Tool

Directions: *Indicate how well the inventoried materials will help students to know about or accomplish the statements for each goal level. Circle the appropriate number for each statement according to the scale below. Compute the Goal Level Average as directed below.*

Evaluation Scale:

Not at all	Poorly	Slightly	Fairly Well	Very Well
0	**1**	**2**	**3**	**4**

Goal Level 1: Ecological Foundations (Knowledge)	**Rating**
1. Populations: The nature/behavior of natural populations (birth, growth, change & its effects, death, extinction, etc.)	0 1 2 3 4
2. Natural Communities: Structure behavior, interaction of individuals and populations in a particular place (forest, desert, sea, pond, etc., food chain, food web, predation, etc.)	0 1 2 3 4
3. Ecosystems: Structure, interaction, and effects between living things and the non-living environment (natural change, succession, adaptation, etc.)	0 1 2 3 4
4. Energy & Chemical Cycles: How energy, chemicals, and pollutants go through a natural system (water, oxygen, energy, carbon, etc.)	0 1 2 3 4
5. Balance of Nature: The tendency of natural systems to establish balance over time when disturbed naturally or by human pollution.	0 1 2 3 4
6. Humans as a Component of Natural Systems: The effect of human behavior on natural systems. (Development of technology, effects of people's attitudes, and values.)	0 1 2 3 4

Ecological Foundations Total: ____Add all circled numbers.

Ecological Foundations Average: ____Divide by 6.

Goal Level 2: Issues and Values (Knowledge)	**Rating**
7. Identifies the difference or discrepancy between an environmental problem and issue. (Environmental problems may be natural or human-caused while issues are the conflicts arising from how people view the problem).	0 1 2 3 4
8. Communicate the way people's culture affects the environment (politics, society, religion, etc.).	0 1 2 3 4
9. Communicate the way individual people affect the environment (individual actions and behavior).	0 1 2 3 4
10. Identifies (clarifies) one's own attitudes and values toward an issue or the environment.	0 1 2 3 4
11. Communicates that there may be more than one way to resolve an environmental issue.	0 1 2 3 4
12. Communicates that the difficulty in resolving environmental issues stems from the different attitudes and values of the people involved in them.	0 1 2 3 4

Issues and Values Total _____ Add all circled numbers.

Issues and Values Average _____ Divide by 6.

Goal Level 3: Investigation and Evaluation (Skills, participation)	**Rating**
13. Uses problem-solving skills to identify specific environmental problems and related issues.	0 1 2 3 4
14. Identifies the people (actors) involved in an environmental issue.	0 1 2 3 4
15. Identifies the beliefs and values that explain people's positions on an environmental issue.	0 1 2 3 4
16. Examines a variety of environmental issues and their solutions.	0 1 2 3 4
17. Identifies the ecological costs and benefits of designated solutions to environmental problems and issues.	0 1 2 3 4
18. Identifies the human costs and benefits of designated solutions to environmental problems and issues.	0 1 2 3 4

Investigation and Evaluation Total: _____ Add all circled numbers.

Investigation and Evaluation Average: _____ Divide by 6.

Goal Level 4: Environmental Action (Knowledge, skills, participation)	**Rating**
19. Communicates the need for responsible citizen action to resolve environmental issues.	0 1 2 3 4
20. Communicates that there are various levels of environmental action (individuals, groups, organizations).	0 1 2 3 4
21. Identifies examples of environmental action categories (persuasion, consumerism, political action, legal action, ecomanagement).	0 1 2 3 4
22. Examines scenarios/case studies that would allow the student to apply knowledge of environmental action and in choosing responsible environmental action.	0 1 2 3 4
23. Identifies the human and ecological costs and benefits to identified environmental actions.	0 1 2 3 4
24. Takes individual and/or group action on an environmental problem they have identified and analyzed.	0 1 2 3 4

Environmental Action Total: _____Add all numbers circled

Environmental Action Average: _____ Divide by 6.

Goal Level 5: Teaching Methods and Practice	**Rating**
25. Do the materials provide specific training in the use of problem solving skills such as observing, inferring, predicting, classifying, hypothesizing?	0 1 2 3 4
26. Do the materials provide opportunities to apply problem solving skills with simulated models, real life situations, scenarios, etc.?	0 1 2 3 4
27. Are the materials educationally appropriate for the intended student users (reading level, conceptual and skill levels, etc.)?	0 1 2 3 4
28. Would the materials be attractive and appealing enough to gain students' interest?	0 1 2 3 4
29. Do the materials contain goals and measurable objectives?	0 1 2 3 4
30. Do the materials provide sufficient suggestions or mechanisms for evaluation?	0 1 2 3 4
31. Is the information provided for students and teachers accurate?	0 1 2 3 4
32. Do the materials provide sufficient background information for the teacher?	0 1 2 3 4
33. Do the materials provide clear directions and suggestions for teaching?	0 1 2 3 4

Teaching Methods Total: _____Add all numbers circled

Teaching Methods Average:_____Divide by 9

Summary Data

_____

Evaluator's Name *Date*

_____

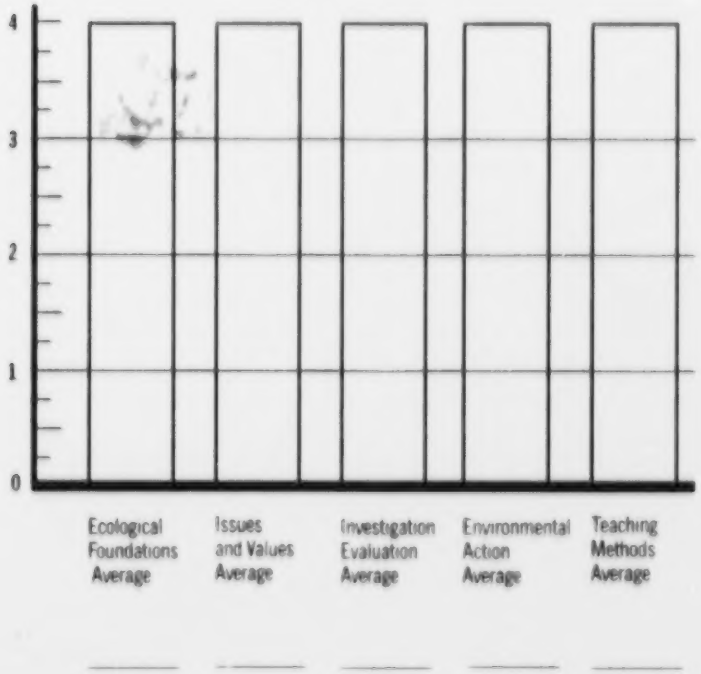
Title of Curriculum Materials *Author*

_____

Publisher *Copyright Date*

Summary Graph

Directions: You may present the results of your evaluation on the graph below (with the averages on pages 1, 2, and 3.) Several people may also choose to combine and average their scores for each curriculum so that a group score can be graphed. Shade the bar that corresponds to each goal.



_____ _____ _____ _____ _____

Adapted and used with permission. J.R. Gardella, 1993. Highland Heights, KY: School of Education, Northern Kentucky University

Master 4

Development and EE Resources Tool

Resource: _____

Rate As: "1" **Meets** criterion
"2" **Some** attention to criterion
"3" **No** attention to criterion
"NA" Not Applicable

	Rating
Knowledge Criteria Resources should contain essential elements of core concepts.	1 2 3 NA
Development Issues	
Sustainable Development Presents the need for balance between economic growth and social development in the interests of sustainable development and overcoming poverty and social injustice.	1 2 3 NA
Environment and Development Presents the importance of ecological balance against the effects of environmental destruction and the need to balance economic growth and conservation through a process of sustainable development. Presents the importance of biodiversity and sustainability.	1 2 3 NA
Rights and Development Presents the individual rights and responsibilities as citizens of local, national, and global communities. Supports the need to eliminate discrimination and other threats to human rights from various sources. Presents the rights of all species as essential for biodiversity and sustainability.	1 2 3 NA
Green Aid Presents aid projects that promote economic development in an environmentally responsible manner. Presents benefits to both donors and recipients.	1 2 3 NA
Global Perspective Presents the interdependence of global economic, social and political systems. A selected global perspective reflects the principles of economic justice, human rights, sustainable development and peace.	1 2 3 NA

Comments:

Critical Skills Criteria
Resources should help participants challenge bias, support rational decision making, examine solutions and prospects for change.

Balance Issues

	Rating
Comprehensiveness Includes a wide range of social-cultural viewpoints. Sensitive to explanations of social structure. Can distinguish between description and exlanation.	1 2 3 NA
Stereotyping Presents a range of roles and human characteristics for any group. In-depth portrayals of sub-groups include accurate presentations of the group culture, from the point of view of that group. Sub-groups portrayed active participants in their community in a variety of decision making situations.	1 2 3 NA
Misrepresentation and Validity Does not present unsubstantiated 'factual' claims as 'truths.' Sources are verifiable, accurate, and up-to-date. Does not include misleading implications.	1 2 3 NA
Technology Does not imply that the world's major problems can be solved by further development of industry and technology. Identifies technology as part of the technical-social complex of productive forces. Technological solutions to social issues are seen in their political, economic, and social context.	1 2 3 NA
Interdependence Presents an issue in its connection with the wider ecological, economic, political, and social environment. Presents individuals and communities as linked.	1 2 3 NA
Decision Making Presents conditions for rational decision-making method. Emphasizes inquiry process of hypothesis and generalization, cooperative learning, critical reflection, dissemination,and involvement and action.	1 2 3 NA
Problem Solving Evaluates the relevance, validity, and implications of alternative solutions. Presents the interests and values underlying various solutions. Supports a multi-disciplinary approach.	1 2 3 NA

Comments:

Attitudes Criteria — **Rating**

Resources should help promote understanding and solidarity among all peoples. 1 2 3 NA

Empathy
Sensitive to the viewpoints and feelings of other people, particularly those belonging to groups, cultures, and nations different from our own. 1 2 3 NA

Respect
Supports the development of self-respect and respect for others, particularly those with national, cultural, and family background different from our own. 1 2 3 NA

Participation
Supports solidarity with victims of injustice in one's own and other societies. Supports participation in political decision-making at local, national, and international levels. Supports solutions of major world issues through cooperation at levels of individuals, organizations, and nations. 1 2 3 NA

Comments:

Values Criteria — **Rating**

Resources should help participants develop a commitment to working with and for others in the interests of equality, equity, and sustainability. 1 2 3 NA

Social Justice
Examines inequalities of wealth and power. Presents efforts to redress them through development, aid, trade, and equity. 1 2 3 NA

Equality of Peoples
Presents the principles of equality and democracy which underlie a belief in the equality of all peoples, as the right of all peoples to life, freedom, and self-determination. 1 2 3 NA

Ecological Sustainability
Presents biodiversity as a right of all living species and as a basic principle of sustainability. Presents intra-generational and inter-generational equity as a right of present and future generations and as a basic principle of sustainability. Presents the satisfaction of essential human needs and aspirations as a priority and as a basic tenet of development. 1 2 3 NA

Comments:

Used with permission and adapted from "Analyzing Education Resources" by Zita Unger, 1992. In Teaching for a Sustainable World: Environmental and Development Education Project for Teacher Education, John Fien, editor. Brisbane, Australia: Griffith University Press.

Master 5 California Compendium Tool

The following evaluation tool used by the teachers to rate materials was adapted from the *California Science Framework*, Chapter 8, "Instructional Materials Criteria."

a.....b.....c.....d e=not applicable
excellent poor

A. General Content

- ☐ 1. Are ideas expressed through unifying themes and big ideas, without facts?
- ☐ 2. Is content interdisciplinary?
- ☐ 3. Are students challenged to utilize higher level thinking processes (i.e., inferring, relating, and applying)?
- ☐ 4. Are ideas presented logically and connected through the curriculum?
- ☐ 5. Is depth of understanding emphasized (rather than encyclopedic breadth)?
- ☐ 6. Are historical, ethical, cultural, geographic, economic, and sociopolitical relationships addressed?
- ☐ 7. Are knowledge and learning shown to be connected to students' lives and society?

B. Presentation

- ☐ 1. Are instructional materials clearly and engagingly written with the main concepts well articulated?
- ☐ 2. Are the roles of environmental ethics, citizenship, and stewardship explored?
- ☐ 3. Do lessons promote respect and caring for the environment, yet be non-dogmatic and open to inquiry and differences of opinion?
- ☐ 4. Are personal and societal values and conflicting points of view explored in context?
- ☐ 5. Are instructional materials easy for students to use and understand?
- ☐ 6. Is learning made accessible to all students?
- ☐ 7. Are writing and concepts developmentally appropriate for the designated grade, yet sensitive to individual differences in educational experience and learning mode?
- ☐ 8. Is environmental responsibility modeled in design, underlying philosophy, and suggested activities by the lessons and materials (e.g. using recycled materials and properly disposing of wastes)?
- ☐ 9. Are there clear linkages presented between communities of all levels ("thinking globally, acting locally")?
- ☐ 10. Are vocabulary words defined in context and not obscuring learning goals?
- ☐ 11. Is the layout of instructional materials interesting and appealing?

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C. Pedagogy

- ☐ 1. Does almost half of the curriculum have students engage in active learning?
- ☐ 2. Do students construct knowledge through research, discussion, and application to gain conceptual understanding?
- ☐ 3. Are evaluation devices included and appropriate? (Highest points for authentic, performance-based assessment devices.)
- ☐ 4. Are instructional materials sensitive to social, economic, and cultural diversity?
- ☐ 5. Do lessons encourage students to develop awareness, knowledge, and strategies for responsible action?
- ☐ 6. Are group/cooperative learning strategies used?
- ☐ 7. Is intergenerational responsibility, linking today's actions with future consequences, implicit in instruction?

D. Presentation

- ☐ 1. Are instructions for the teacher clear and concise?
- ☐ 2. Are lesson objectives and outcomes clear and appropriate?
- ☐ 3. Are materials easily integrated into an established curriculum?
- ☐ 4. Is background information for the teacher adequate and accurate?
- ☐ 5. Can the materials be adapted to varied learning environments (large or small classes, of mixed levels, from rural or urban settings)?
- ☐ 6. Are consumable instructional materials of good quality, easily duplicated for student use, and in sufficient quantity to support the objectives?
- ☐ 7. Are equipment and materials listed and reasonably accessible?
- ☐ 8. Are a variety of instructional strategies, expanded learning environments, and resources suggested in the curriculum's design?
- ☐ 9. Is the time required to complete each lesson indicated?
- ☐ 10. Do the materials clearly list the subject discipline(s) integrated into each lesson?

Used and adapted with permission by the California Department of Education from the Environmental Education Compendium for Water Resources. The California Department of Education. The California Department of Water Resources. Sonoma State University. March 1992.

Activity 4

Learning to Look

Objectives

To introduce teachers to the power of pedagogy and how it will effect their evaluation.

Materials

Activities from Master 6 and 7 or two activities that cover the same topic. Optional: Copies of Master 3, 4, and 5.

Time

40 minutes

Preparation

This activity suggests teachers compare two EE activities for students. One pair is provided, though you may substitute another from your own materials. If so, look for activities that are designed for the same age level, cover the same content, and have similar learning objectives, but use different teaching methods to reach the goals. For example, the activities on Masters 6 and 7 look at the value of farmlands but use slightly different approaches. "Down on the Farm" uses simulation and discussion. "Vanishing Farms" uses simulation and role play.

Other potential sets of activities are:

"Water, Water Everywhere" from *Earth Matters*, "How Wet is Our Planet" from *Aquatic WILD*, and "Eighty-six Gallons per Day" from *Living Lightly on the Planet*;

"Bye Bye Birdie" from *Earth Matters* by ZPG and "Here Today, Gone Tomorrow" from *Project WILD*;

"Watch on Wetlands" from *Project Learning Tree* and "The Great Swamp Debate" in NatureScope's *Wading into Wetlands*.

Outline

Start a discussion among teachers about pedagogy and the design of instructional materials. Ask them to think about how these concepts affect the way we evaluate an activity or activity guide. Explain that a single activity rarely incorporates all the goals in the instructional guide. Duplicate the activities so each participant receives a pair.

1

Divide the participants into teams of four to five. Hand out copies of Masters 6 and 7 to everyone. These activities have similar content but different objectives. Challenge the teams to critique both activities, noting the teaching methods, student outcomes, and ultimate objectives. You may wish to have the teams use one or more of the evaluation tools from Masters 3, 4, or 5.

2

Lead a discussion about the difference in the two materials using the following questions:

- Would each activity meet your teaching objectives? Why or why not?
- What makes a good learning experience?
- What criteria would you use to evaluate each activity?
- What criteria ought you use for the pedagogical aspect of the materials?

Master 6

Down On The Farm

Objectives:

Students will:

- Measure and mark off an area of land which represents the amount of land required to feed them for one year.
- Investigate the conflict over private vs. public control of farmland resulting from agricultural zoning.

Materials:

Student information sheet provided; a long tape measure (at least 71 yards long) or, for a handy measuring device,use a yardstick, four small nails, 71 yards of kite string, and a hammer. You will also need four stakes marked with brightly colored paint or material.

Advance Preparation:

To make the measuring device, pound two small nails into each end of a yardstick. Tie one end of the string to the nails at one end of the stick.

Overview:

It takes approximately 1.2 acres of land to feed one person each year. This includes grazing land for dairy and beef cattle as well as cropland to grow grains, fruits, and vegetables. Between 1967 and 1973 the amount of cropland and potential cropland converted to urban uses was 875,000 acres per year. This rate of cropland conversion is causing some concern in that we may be presenting future generations with a shortage of productive land. In an effort to stem the tide of cropland conversion, many communities are developing land use plans which include zoning laws to preserve farmland. The conflict that these laws create will be debated by your students as they investigate this issue.

1. Ask students how much land they think would be required to feed each of them for a one-year period. Round the 1.2 acre figure off to one acre and take your students out to measure an acre of land on your school grounds. An acre is 4,840 square yards (4,047 square meters). A square 69 yards, 20.5 inches on each side is an acre. (If the land you have to work with is not large enough, measure a one-half acre area. A half acre square is 49 yards, 7 inches on each side.)

   If you use the measuring device suggested above, have students wrap the string around the yardstick. Each loop around the length of the yardstick equals two yards of string. Have them wind the string until they have 69 yards, 20.5 inches and cut the string. Then use the string like a tape measure to mark off the four corners of the acre. Have some students hammer a stake into the ground at each corner.

2. Discuss the figures below that indicate what is happening to our individual share of cropland on a global basis.

Year	Cropland per person
1650	4 acres
1975	1 acres
2135	1/4 acres (projected)

   The decline of arable land per person is projected to decrease as the world population continues to expand. Most of the land suitable for farming is now in use. Only 11 percent of the world land is arable. The rest is too steep or cold or too dry to support agriculture.

3. Either read the information on the student sheet or distribute copies for students to read on their own. Discuss the issue of agricultural zoning and its infringement on individual property owner's right to sell their land as they choose. Review the discussion questions on the student's sheet and have students express their own points of view on the issue.

Extensions:

Write the following statement on the board: "Asphalt is the land's last crop." (The statement was made by M. Rupert Cutler, former United States Assistant Secretary of Agriculture, in reference to the problem of vanishing farmland.) Have students use this as an introductory sentence in an essay expressing their views on the subject of farmland conversion.

To help your students understand the special nature of topsoil, have them plant corn seeds in a container of topsoil and in a container of subsoil. Subsoil is the layer of nutrient-poor soil to be found under humus-rich topsoil. It provides a poor growing medium and will help students to realize that not all land is suitable for growing food.

Student Information

How would you react to this situation if it were taking place in your community?

Voices are rising along with tempers in the crowded room in City Hall. There is a public hearing being held to give citizens a chance to express their views about the proposed new zoning laws. Zoning laws set aside areas of land for specific uses. When a community has zoning laws, some areas are zoned for homes, others for industry, and other areas are zoned for open space. In this community new zoning laws will restrict the uses of farmland. There is a hot debate taking place between people who are divided in their opinions.

The proposed zoning would require that farmland be sold in tracts no smaller than 40 acres and that the lands remain as open space or farmland.

The community is near a growing city. The trend has been for farmland to be sold and divided into subdivisions and shopping malls. In many cases, it was more profitable for farmers to sell their land to developers than to continue to farm. Many farmers are angered over the proposed denial of their right to sell their own land for uses other than farming. They believe that people should have the right to do what they want with their own land.

Other people in the room are concerned about the community's loss of farmland. They view the land as a valuable, irreplaceable resource. They argue that farmland should not be viewed as something to be bought or sold, but as a resource to be preserved for future generations. They believe that preservation of farmland is a social obligation. This leads them to believe that the public, in this instance, has the right to exercise control over these valuable lands. The debate rages on.... What do you think?

Discussion Questions

- How would you react to the proposed zoning restrictions if you were a farmer? A housing developer?
- Do you believe that the public, in the form of government, has the right to impose restrictions on individual landowners? State reasons for you beliefs.
- Should land use decisions we make today consider the needs of generations which will follow us? Why or why not?

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Master 7

Vanishing Farms

Objective:

Students will gain an understanding of the pressures to develop open space and farms.

Summary:

Students will role-play farmer, crops, farm animals and the different types of interests that also desire land.

Time:

45 minutes

Student Grouping:

Whole class

Materials:

10-30 foot piece of string with ends tied together to make a circle. (Longer string for larger groups)

Background Information:

Every year three million acres of farmland are lost to some sort of development. If this continues, eventually there will not be enough land to grow food. Localities have begun to make ordinances and laws that facilitate maintaining agricultural land. The issue of private rights versus the common good is brought into play in these situations.

Marin County, California, Agriculture Facts:

The debate over land use is very real to Marin residents. For years there have been efforts to preserve county agricultural lands. Many people have been involved, particularly since the 1970's, in making it feasible for farmers to keep farming in spite of the skyrocketing prices of land in the area. The Williamson Act, passed in 1965 and amended in 1970, allows for reduced property taxes for agricultural lands within certain areas. MALT, the Marin Agricultural Land Trust, purchases agricultural easements, restricting future uses of property to agriculture and recreation. Without these types of provisions, much more development would be inevitable.

Preparation:

1. This is a very simple activity. You just need to be familiar with the exercise so it will flow smoothly in class.
2. Acquire your string and decide where you will lay it out.

Procedure:

1. Place the string on the ground in a circle.
2. Assign one student the role of "Farmer."
3. The farmer lists the crops and livestock he would need in order to feed and clothe the local people. As the farmer names the things on his list (like corn, wheat, cows, sheep, fruit) a student is selected to step into the circle and represent the commodity named.
4. One by one the rest of the students become people who also want to use the farmland: for example, a road builder, someone developing a shopping center, someone digging for water, a school builder, a hotel owner. These people move to the edge of the farmland, pick up the string and move it inward, making the circle smaller.

5. Developers continue until the farm circle is too small to hold all the farmers livestock and crops. There has been too much development in the area and thus the farm has vanished.

6. Discuss the activity with the students.

Questions for Discussion:

- How does development pressure affect food production?
- Would this affect prices?
- What can all those developers do?
- What can farmers do?
- How does development and loss of farmland affect the families in the community?

Extensions:

- Have a farmer and developer come to the class and talk about their ideal plan for land use in the area.
- Find some old pictures of the school area (check with a local historical society or local paper) and compare the open space then and now.

How does Marin Agricultural Land Trust work?

Marin Agricultural Land Trust (MALT) seeks to permanently protect Marin's agricultural lands by purchasing agricultural easements from ranchers.

An easement is a legal property right and can address many of the ways in which land can be used. An agricultural easement is one which allow the land to be used for agricultural purposes. MALT buys agricultural easements and then permanently assures that they are not sold off to allow subdivision of the land for development.

Agricultural easements are always sold willingly by ranchers to allow them to get cash for farming operations, to make improvements, or meet other needs. The farmer selling the agricultural easement still owns the property, and the land is guaranteed to stay in agricultural production.

MALT was formed by a coalition of ranchers and environmentalists in 1980 and is considered a national model for agricultural land preservation.

Used with permission and adapted from "Vanishing Farms" by Leeann Tourtillott and Ellen Rilla, 1992. In Food for Thought: Agricultural Classroom Activities for Growing Minds. University of California Cooperative Extension, Marin Agricultural Literacy Project.

Activity 5

What About Bias?

Teachers discuss the inevitability of bias and practice discovering it in materials.

Objectives

To enable teachers to detect bias in teaching materials and help them to develop strategies that overcome biases in EE instructional materials.

Materials

Handouts made from Masters 6 and 7.

Time

30 minutes

Outline

Begin by explaining that all materials have some bias toward the author's, producer's, or funder's viewpoints. Whether from industry, textbook companies, government, or environmental organizations, most material includes a particular bias.

1

Have teachers brainstorm the types of bias that they have detected in instructional materials. Some possible answers are: gender, age, culture, resource use vs. preservation.

2

Divide the participants into small groups and distribute Masters 6 and 7 to each. Ask the groups to list examples of where the author's bias comes through.

3

Have groups share their insights. Note whether the groups came up with the same biases and examples. If there are differences, ask the group to consider how their personal biases affected their perception of the materials.

4

Ask how teachers might approach materials with bias. Add to their list any of the following:

- — Not use the material
- — Accept bias as is
- — Balance this with other materials of an opposite bias
- — Have students discover the bias as a learning experience
- — Modify materials to reduce bias

Have each group discuss what they might do with these activities given the bias they found. Record all strategies on an overhead or newsprint.

5

(Optional)

Ask participants to generate questions for an evaluation tool that would address their concerns about bias.

VII

Resources

Glossary

Textbook definitions may be helpful in providing additional examples for these terms. These definitions refer to the techniques and forms described in this unit.

Evaluation Tool/Instrument – The test, questionnaire, or checklist used to measure the performance of the instructional materials to be evaluated.

Formative Evaluation – Evaluation done during development of instructional materials for the purpose of rewriting and improving the quality of the final product.

Measurement – Provides quantitative descriptions of the characteristics of a variable.

Qualitative Data – Non-numerical information often obtained through open-ended questions, observations, or interviews.

Quantitative Data – Numerical information from an evaluation. This information can be manipulated and may be reported as an average, rank, median, mean, or standard deviation.

Reliability – For our uses this refers to the consistent nature of the evaluation tools' performance. Does the tool yield consistent results under similar circumstances? The degree of consistency determines the reliability of the tool.

Significance – The odds that observed differences or similarities are due to the "real" influence of variables and not chance.

Standard Deviation – A statistical function that serves as measurement of the degree of agreement between responses for a specific criterion on a given piece of material.

Summative Evaluation – An evaluation done to examine the end result of a project or activity. Materials developers may conduct a summative evaluation to measure whether their product does what it was intended.

Validity – An estimate of the degree to which an evaluation tool measures what it is designed to measure.

Variables – All the factors that could affect results of an evaluation project. For example, the evaluator may tire with a lengthy tool and therefore rush through the evaluation of the last few pieces of instructional material.

Evaluated EE Activity Guides

The Curricula and Compendia Project, Six Volumes: Energy Resources, Water Resources, Integrated Waste Management, Air Quality, Human Communities, and Natural Communities. California Department of Education, 1992-95. Sacramento, CA. These compendia contain the results of evaluations of K-12 environmental education curricula based on presentation, pedagogy, teacher usability, general content, and subject-specific content. Each compendium includes a "report card," evaluator comments, a brief description, and sample pages. Available from:

Bureau of Publications, Sales Unit
California Department of Education
P.O. Box 271
Sacramento, CA 95812-0271
✆ (916) 445-1260
Fax: 916 323-0823

"Curriculum Materials for EE," D.L. Haury, J.E. Heimlich, and M. Norton, edited by R.J. Wilke. In ***Environmental Education Teacher Resource Book, A Practical Guide for Environmental Education***, 1993. Milwood, NY: Kraus International Publications. A selected, annotated listing of readily available materials for use in environmental education. Included are curriculum guides, supplementary materials, activities, nonprint media, modules, etc.), program frameworks, and resource materials. Available from:

Kraus International Publications
358 Saw Mill River Rd.
Milkwood, NY 10546
✆ (914) 762-2200

Educating Young People About Water. A Guide to Goals and Resources with an Emphasis on Nonformal and School Enrichment Settings. Elaine Andrews, 1992. Madison, WI: University of Wisconsin. This guide was developed by the Water Curriculum Needs Assessment Project to help curriculum coordinators select and develop water quality training programs and curricula. Includes summaries of 63 reviewed curricula. Available from:

Elaine Andrews
University of Wisconsin
Environmental Resources Center
216 Agriculture Hall
1450 Linden Drive
Madison, WI 53706
✆ (608) 262-6968

Energy and the Environment: A Teacher's Resource Guide. Pacific Gas and Electric Company, 1991. San Francisco, CA. A catalog of energy education resources for elementary, secondary and higher education. Available from:

Pacific Gas and Electric
Energy and Environment Department
77 Beale, 28th Floor
San Francisco, CA 94106
✆ (415) 973-4361

"Evaluation of Selected Recycling Curricula: Educating the Green Citizen," S. Boerschig and R. DeYoung. In ***Journal of Environmental Education***, 24:17-22. 1993. Evaluation of 14 solid waste curricula. Provides a ratings matrix of evaluated materials and recommendations for development of new materials.

Evaluation Tools

"Analyzing Educational Resources," Zita Unger, edited by John Fien. In ***Teaching for a Sustainable World: Environmental and Development Education Project for Teacher Education.*** 1992. Brisbane, Australia: Griffith University Press. This workshop outline includes guidelines for group discussions, overhead masters, readings, and an evaluation instrument to help participants become engaged in evaluation issues, particularly bringing to light the range of ideologies and viewpoints that are embedded in resources. Available from:

Dr. John Fien
Faculty of Environmental Sciences
Griffith University
Nathan, Brisbane
Australia 4111
fax: 61-7-875-7459

"A Checklist for Reviewing Environmental Education Programs," Fred C. Niedermeyer. In ***Journal of Environmental Education***, 23 (2):46-50. 1992. Enumerates, in a checklist form, the characteristics of well-developed, effective instructional programs to provide criteria for their review.

Environmental Education Curriculum Inventory. J.R. Gardella, 1993. Highland Heights, KY: School of Education, Northern Kentucky University. Includes two forms that use accepted goals of environmental education in a checklist format with a data summary device to identify the emphasis of the evaluated curricular materials. Available from:

North Kentucky University
Education Department
Highland Heights, KY 41099
✆ (606) 572-5624

"Evaluating Sponsored Materials," Mary E. Haas. In ***How To Do It in the Social Studies Classroom Series.*** 1985. Washington, D.C.: National Council for the Social Studies. Two evaluation forms are provided to carefully evaluate sponsored materials and guest speakers. Available from:

The National Council
for the Social Studies
3501 Newark St., NW
Washington, DC 20016
✆ (202) 966-7840

Additional Readings

If you are interested in more information on evaluation or want to do a formal evaluation project we recommend these resources.

"The CIPP Model for Program Evaluation," D.L. Stufflebeam, edited by G.F. Madaus, M. Scriven, & D.L. Stufflebeam. In ***Evaluation Models.*** 1993. Boston: Kluwer-Nijhoff. The CIPP approach is based on the view that the most important purpose of evaluation is not to prove but to improve. Evaluation is seen as a tool by which to help make programs work better for the people they are intended to serve. Available from:

Kluwer Nijhoff Publications
101 Phillip Drive
Norwell, MA 02061
✆ (617) 871-6600

Criteria for Evaluating Instructional Products. James L. Moseley, 1987. ERIC Document Number: 281-870. This five-page checklist presents a rating scale approach to evaluation instructional products and educational media. Fifteen categories of evaluation criteria are included. Available from:

ERIC
555 New Jersey Ave., NW
Washington, DC 20208-5720
(202) 219-2088
✆ (800) 538-3742

"Evaluating Environmental Education in the Context of a Junior High School State Studies Program," Dean Bennett. In ***Journal of Environmental Education***, 13(4): 13-18. 1982. Describes the Maine Studies Curriculum, a state-validated demonstration project taught as part of the regular school curriculum. Also describes the curriculum evaluation procedure and results.

"Evaluation of Environmental Education Programs at the Elementary and Secondary School Levels," Bernard J. Lucko, John F. Disenger, and Robert E. Roth. In ***Journal of Environmental Education***,13 (4): 7-12. 1982. Provides an overview of recent and current activity in environmental education, particularly as it relates to program evaluation in elementary and secondary schools. Also includes major steps in conducting an evaluation based on the goals of environmental education.

"Evaluating Instructional Materials," Tim Wentling and William E. Piland. In ***Local Leader Guide IX: Locally Directed Evaluation Handbook***. Second Edition.1982. Springfield, IL: Illinois State Board of Education. One of 12 guides that have been developed to facilitate evaluation by and for local education agency personnel in Illinois. Covers the evaluation of both print and audiovisual instructional materials. Available from:

Curriculum Publications
Clearing House
Western Illinois University
Horrabin Hall #46
Macomb, IL 61455
✆ (800) 322-3905

"Evaluation of Natural Resource Education Materials: Implications for the Resource Manager," Gerri Pomerantz. In ***Journal of Environmental Education***, 22 (2): 16-23. 1990. An analysis of elementary school and natural resource lessons that focus on ecological principles, resource management issues, and analytical skill development. The conclusion is that very few of the lesson materials help to develop critical thinking skills and behaviors necessary for environmental action.

Experimental and Quasi-Experimental Designs for Research. Donald T. Campbell and Julian C. Stanley, 1963. Chicago, IL: Rand McNally College Publishing Co. Examines the validity of 16 experimental designs against 12 common threats to valid inference. Available from:

Rand McNally College Publishing Co.
444 N. Michigan Ave.
Chicago, IL 60611
✆ (312) 321-1751

Procedures for Developing an Environmental Education Curriculum. Harold Hungerford and Robert Ben Peyton, 1986. EE Series 22. Paris, France: United Nations Educational, Scientific and Cultural Organization. ERIC document: ED 277 569. This publication is an update of a 1980 document and relates trends in environmental education to curriculum development. Available from:

Unesco
Environmental Education Unit
7 place de Fontenoy
75352 Paris 07 SP
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Sonoma State University
Environmental Studies and Planning Department
1801 East Copati Ave.
Rohnert Park, CA 94928
✆ (707) 664-2306

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California State Department
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P.O. Box 271
Sacramento, CA 95802-0271
✆ (916) 653-7026

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ERIC
555 New Jersey Ave., NW
Washington, DC 20208-5720
(202) 219-2088
(800) 538-3742

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ENDNOTES

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8. As of this printing Project Learning Tree has not yet published the results of their evaluation. For more information on this evaluation project contact Kathy McGlauflin, Director, Project Learning Tree, 1111 19th Street NW, Suite 800, Washington, DC 20036. (202) 463-2468.

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